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(54) **Process and means for making and using of footwear bipolar lasts, particularly adapted to self extending to stress the shoe or the like being shaped, and lasts obtained with such process and means.**

(57) A footwear bipolar last, is adapted to self extending and to stress the shoe or the like being worked thereon. The coupling (333) provided between the two polar bodies (2, 2') of the shoe last (2, 333, 2') comprises at least a longitudinal guide (3) substantially axial which adjusts the shifting between the two components (2, 2') in a range comprised between 5 mm and 30 mm, keeping them in line and in the same direction and comprising a spring (30) which permanently and intensely forces the two polar bodies (2, 2') in the most mutually allowable far apart position.

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Process and means for making and using of footwear bipolar lasts, particularly adapted to self extending to stress the shoe or the like being shaped, and lasts obtained with such process and means.

The present invention relates to a process and means for making and using, of footwear bipolar lasts, for shoes and the like, whose polarities are articulated, which are particularly adapted to self extending whereby to stress the shoe or the like being shaped . The present invention relates also the provision of lasts obtained with such process and means and adapted to improve the process for manufacturing shoes and the like, in which they are employed.

As it is known, the lasts for shoes and the like, are those tools, difficult to manufacture in itself which, moreover, convey in a process of production, thoroughly determining it. In other words, the three realities: i) operative arrangement of the last; ii) process and means for its production; iii) process and means for using it.

In the present state of the art, the problem of a last for shoes has never been faced in its entirety, but only mere secondary aspects of it were solved, which, even valuable as special solutions, resulted to be relatively poor, from a global perspective. Starting from the arrangements used to provide said last, such as to be adjustable, at least for the final extraction from the shoe in which the same is being used, at present, this adjusting, is obtained by splitting, such lasts for shoes, in at least two parts, substantially polar, generally interrupted in the central part. An adjustable coupling is therebetween provided, comprising an hinge, which, as such, needs to be suitably driven, to perform swinging movements and the like, which are automatically unamenable. While, the hinge, provided between the two polar bodies, of present lasts for shoes, was relatively cheap, comprising generally one pivot and one spring, shaped substantially as an omega, the working of each polar body of each last for shoes, and for its assembling, were such and so many to render expensive the arrangement, in its whole, also because, such operations, had to be executed, complying with very strict tolerances and on bodies comprising irregular, heterogeneous and indefinite shapes, particularly unamenable by any mechanical working, in general and in particular to the automatical one. On manufacturing the shoe, in addition to difficulties to manipulate the polar bodies of shoe last, by complying with swinging and the like movements, the last instead of determining the shoe shaping process it undergoes it. In fact, in footwear assembling and shaping process, from one side, the shoe being shaped, with the last mounted therein is heated for distending the same shoe and in this stage the last therein is engaged to play its task. Despite of this, the lasts according the present state of the art in the very stage when the cooling contraction took place and the shoe last was engaged to play its own peculiar task it failed and resulted compressed by the shoes, thus complicating its removal therefrom; the necessary strain involved could cause immediate and virtual breaks. Such strains affected heavily even the shoe, for the reason that only one polar part of the known lasts was provided with removal means, generally a single bore, and a counteraction on the shoe was needed to swing off therefrom both parts of the last.

The invention as claimed is intended to remedy these drawbacks. It solves the problem of harmlessly stressing the shoe or the like being shaped by providing means which are automatizable.

To provide an efficient coupling between the two shoe last poles, the arrangement comprises at least a longitudinal guide, substantially axial, which controls the movement of the shoe last pole members, in a range from 5 mm and 30 mm, keeping them in line and with the same orientation. Such control is provided by a spring which permanently and intensely forces the last pole members to assume a distant position thus shaping the shoe therearound. According to a preferred embodiment of the present invention the guides of the shifting device are at least two and each last pole is provided with an holdable means particularly comprised by a bore. Alternatively, for maintaining the orientation, particularly when a single guide is provided a polygonal cross section or a similar keying therefor is used.

One way of carrying out the invention is described in detail below with reference to drawings which illustrate two specific embodiments, in which:

Figure 1 is a side cross section of a mold to provide a blank body of plastic material having approximately the shape of one foot and possibly of both feet; it represents the first, known, stage of the process according to the present invention.

Figure 2 is a side view of blank body as obtained from the first stage of figure 1.

Figure 3 is a longitudinal, axial, vertical, cross section of the blank of figure 2, in the attitude wherein the centering tools of a rough shaping machine for lasts provides the polar ends with dimples, even this stage being conventional.

Figure 4 is a longitudinal, axial, vertical, cross section of the body of figure 3 in the attitude wherein the tools of said shoe last rough shaping machine provide the rough shaping thereof, even this stage being conventional.

Figure 5 is a longitudinal, axial, vertical, cross section of the body of figure 3 in the attitude in which a tool, of another finishing machine for shoe lasts working, provides the finishing of the last. This stage is substantially conventional but, according to the present invention, the conventional stage of providing an hinge is skipped.

Figure 6 is a longitudinal, axial, vertical, cross section of the body of figure 5 in the attitude in which a tool, of an additional finishing machine for shoe lasts, provides: in a first station thereof, the finishing of the tapering end, by removal of the dimple thereof, in a second station the same working on the last heel and in a third station the facing of the upper side of the last, which comprises a reference face which is essential for further working and plays an important task in the process according to the present invention.

Figure 7 is a longitudinal, axial, vertical, cross section of the semiworked piece of figure 6, in the attitude in which a tool device of another machine for drilling and capsuling provides, in a first step, the drilling of a hole and the mounting therein of an holdable sleeve.

Figure 8 is a longitudinal, axial, vertical, cross section of the semiworked piece of figure 7, in the attitude in which the same tool device of same machine for drilling and capsuling provides, in a second step, the drilling of a second hole and the mounting therein of a second hole and the mounting therein of a second holdable sleeve at a calibrated distance from the first and exactly parallel to the same. This second step of drilling represents a peculiar feature of the present invention.

Figure 9 is a longitudinal, axial, vertical, cross section of the semiworked piece of figure 8, in the attitude in which, by a special sawing machine, the last set upside dawn in sawn, splitting the poles thereof from a short central separated section which is disposed. Even this splitting stage represents a peculiar feature of the present invention.

Figure 10 is a longitudinal, axial, vertical cross section of the forward semiworked pole of figure 9, in the attitude in which, by a special horizontal drilling machine said last forward pole is drilled longitudinally from the rear side, exactly in connection with its shape. Even this drilling stage represents a peculiar feature of the present invention.

Figure 11 is a longitudinal, axial, vertical, cross section of the rear semiworked last pole of figure 9 in the attitude in which, by a special horizontal drilling machine, the rear last pole is drilled longitudinally from the rear side, exactly with reference to its shape. Even this drilling stage represents a peculiar feature of the present invention.

Figure 12 is an exploded perspective view of a joining shiftable device according to a preferred embodiment of the present invention.

Figure 13 is a perspective view of the joining shiftable device, duly mounted on a last, ready for use.

Figure 14 is a detailed cross section of coupling of figures 12 and 13, in the attitude in which the rear end of the device is mounted on the rear pole of the last.

Figure 15 is a detailed cross section of the coupling of figures 12 and 13 in which the forward end of device is mounted on the forepole of the last.

Figure 16 is an exploded perspective view of another device which controls the shifting of its members according to another embodiment of the present invention.

Figure 17 is a longitudinal cross section of the assembled device which controls the shiftable coupling and in a stage wherein the poles thereof are completely spread apart.

Figure 18 is a plane view of figure 17 showing that the guides of shifting device are twofold.

Figure 19 shows, schematically, in a reduced scale how a last can be manipulated by a simple handling device, providing an increased efficiency, in term of stroke and contractibility, i.e., capability of being introduced in and removed from the shoe being shaped. The same is shown in the attitude in which the last is contracted and the semiworked shoe is being worn thereon.

Figure 20 is substantially a repetition of figure 19 but in the attitude in which the last is expanding stressing the shoe being formed, such stressing being provided by at least one spring therein included.

Referring now to the figures of the drawings, a blank body 1, of plastic material, having approximately the shape of a foot and possibly of both feet is provided by moulds 10, 10' (figure 1). The blank body 1 is conventionally placed on a rough shaping machine for lasts of which only the center drill tools 11, 11' (figure 3) and the rough shaping tool 15 (figure 4) are shown. As shown in figure 3 the center drill tools provide the dimples 01, 01' in each end respectively; then the tool 15 provides the rough shaping of last blank body 1" (figure 4). Thereafter, the rough shaped piece is placed on a finishing machine for lasts of which only the cen-

ters 14, 14' and the finishing tool 15' are shown. Herein the body 1" is shape finished to provide the semiworked piece 1'''. Thereafter, the semiworked piece 1''' is set on an additional finishing machine for lasts of which only the tools 16, 16', 16'', are shown, at figure 6.

In a first station the tool 16 provides the finishing of the forward tapered end by removing the section including the dimple 01; in a second station the tool 16' provides the finishing of the rear end by removing the section including the dimple 01'; according to the present invention in a third station the tool 16'' provides the facing of the top side 01'' of last which represents an essential reference for the following working setting. As partially shown in figure 7 and 8 the semiworked last 1''' of figure 6 is placed on a drilling and capsuling machine of which only a drill 17, a head tool 17' and a wise-chariot 18 for locking and setting the semiworked last, in each of two positions (figure 7 and 8), are shown. Herein, in a first stage, a bore is provided by drill 17 (figure 7) and a sleeve 02 is forced therein and in a second stage (figure 8) another bore is drilled and a second sleeve 02' is provided at a calibrated distance from the first one 02 and exactly parallel to same. Thereafter, the semiworked last 1''' of figure 8 is set on a special sawing machine of which only a shaft 19, with a pair of disk-like 19', 19' and the wise 18' are shown, in figure 9. Here, the semiworked last duly set and locked, is shown while is being sawn to split the last poles 2, 2' from a short central part 1''', which is discarded. Thereafter, the last forward pole 2, as shown in figure 10, is set on a special horizontal drilling machine of which only the wise 20 and the drill tool 21 are shown. Such forward pole 2' of last is set horizontally locking it with reference to its shape and to the capsule 02 and in this locked condition is bored by the drill 21 to provide the bore 22. Substantially in the same manner the last rear pole 2', as shown in figure 11, is set on the special horizontal drilling machine of which only the wise 20' and the stepped drill tool 21' are shown. Such rear pole 2 of the last is set horizontally locking it thereon with reference to its shape and to the capsule 02' and in this locked condition is bored by the stepped drill 21' to provide the stepped bore 22'.

Reference will now be made to the device 333 (figure 12), which controls the shiftable coupling which, according to a preferred embodiment of the present invention comprises: a rod 3, a spring 30, a longitudinal shifting sleeve 33 and a snap ring 03 of coupling. The rod 3 is provided at one end with a cylindrical tang 33'' to be coupled with the bore 22'', whereby to provide a locked joint therewith. The central part of the rod is polygonal e.g. hexagonal; it is finished as to be shiftable in the sleeve 33. The outer surface of same sleeve 33 is roughened so as to be lockedly joinable with the bore 22. On the other hand, it is important that for minimizing the costs the device 333 is coupled to the poles 2, 2' of the last in assembled condition, i.e. as shown in figures 13, 14 and 15. Such assembling is provided by mounting sequentially on the rod: the snap ring 03, the sleeve 33 and the spring 30. In fact, firstly, the rear end 33'' of device 333 is mounted on the rear pole 2' of the last, by enclosing, between the pole 2' and the ring 03, the spring 30 and the sleeve 33. This is provided by a press of which only the hollow plunger 4 is shown (figure 14). Thereafter, the forward end of device 333, comprised by the sleeve 33, is coupled to the forward pole 2 of the last which is represented by the bore 22. This is provided by a press of which only the plunger 4' is shown (figure 15). Its action is made amenable by the counteraction provided by a rest 4'' which is presently removed.

According to another embodiment of the present invention (figures from 16 to 18) instead of the polygonal coupling a pair of devices 333' are provided, each comprising: a cylindric rod 3', a spring 30', a longitudinally shiftable sleeve 33' and a snap ring 03' of coupling. Each rod 3' is provided at one end with a cylindrical tang 133'' to be coupled with each bore 22'' which to any effect is to be considered twice. The central section of each rod is finished so as to be shiftable in each of sleeves 33'. The outer surface of each of sleeves 33' is roughened so as to be lockedly joinable with each of the bores 22. For coupling of this device to the poles 2 and 2' of the last reference may be made to the explanation given when considered twice and with reference number with apex (figures 17, 18).

The way by which the shoe last, according the present invention, can be manipulated by a simple handling device, providing an increased efficiency, in term of stroke and contractibility, i.e., capability of being introduced in and removed from the shoe being shaped, is shown, in a reduced scale, in figures 19 and 20. More particularly, in figure 19 the last 2, 2' is shown in contracted condition and the semifinished shoe 5 is being slipped thereon. Whereas, as shown in figure 20, the last 2, 2' is in an expanded condition and the shoe 5, being shaped thereby, is stressed by one or more springs 30, 30' included in the last to provide a shoe shaping stretching. It will be appreciated that the device 44 providing the contraction and expanding of the holdable sleeves 02, 02', is very simple and extremely efficient so that even the same process of making shoes results to be improved in that the stretching of members of shoe 5

and in particular its upper occurs in a self governing and permanent way due to the spontaneous action of springs 30, 30'.

Claims

1. Footwear bipolar lasts, of the kind having articulated polarities, particularly for shoes and the like, characterized in that they are particularly adapted to self extending and to stress the shoe or the like being worked thereon.

2. Bipolar lasts, as claimed in claim 1, characterized in that the coupling provided between the two polar bodies (2, 2') of the shoe last (2, 333, 2') comprises at least a longitudinal guide (3) substantially axial which adjusts the shifting between the two components (2, 2') in a range comprised between 5 mm and 30 mm keeping them in line and in the same direction and comprising a spring (30) which permanently and intensely forces the two polar bodies (2, 2') in the most mutually allowable far apart position.

3. Bipolar lasts, as claimed in claims 1 and 2, characterized in that the guide providing a shiftable coupling is at least twofold (333, 333') and that each last polar body (2, 2') is provided with an holdable means particularly in the form of a depression (02, 02').

4. Bipolar lasts, as claimed in the preceding claims, characterized in that the coupling provided between the shoe last polar bodies (2, 2') comprises a single guide (3) which is nonround, e.g. polygonal, in cross section.

5. Process for making bipolar shoe lasts as claimed in claims from 1 to 4, conventionally comprising the moulding of a body (1) of plastic material or the like having approximately the shape of one foot and possibly of both feet, working said body on a shoe last rough shaping machine to provide it with dimples (01, 01') and rough shaping it, working said rough shaped shoe last (1") on another finishing machine, wherein in a first station the working of the forward pole (2) of the last is provided, characterized in that it comprises: the removal of the shoe last heel dimple (01') to be effected in a second station of said other finishing machine, a flattening of the last plateau (01") to be provided in a third station of said other finishing machine, the drilling and capsuling at a set and calibrated distance on said plateau two parallel depressions (02, 02'), the splitting of last single body (1") into two polar extremities (2, 2') and one short central part to be disposed, the drilling from the fresh rear side of the last forward pole (2) while it is fastened duly laid upside down, particular reference being made to its outer shape and to the inherent holdable capsule (02), the corresponding drilling of the rear pole (2') of the shoe last which is provided with an exact stepped depression (22') particularly of precision and providing a stepped bore referring exactly to the outer shapes and to a sleeve and eventually coupling said shifting device to the poles of the last by enclosing at least a spring (30, 30').

6. Process as claimed in claims 4 and 5, characterized in that the assemblage of the shifting device (333, 333') to the shoe last poles is provided by heavily forcing the couplable members (33", 22"; 22, 33) thereof to lock.

7. Process, as claimed in claim 6, characterized in that, the coupling members provided on the shoe last poles (2, 2') are in the form of depressions (22, 22") whereas the coupling members provided on the device (333, 333') of coupling are substantially complementary at least in connection with depressions, wherein one of the members (33) thereof plays a female function in connection with the shifting device (333, 333').

8. Process, as claimed in claims from 4 to 7, characterized in that the coupling device comprises: at least one rod (3), at least one spring (30), at least one sleeve (33) for longitudinal shifting and at least a snap ring (03).

9. Process, as claimed in claim 8, characterized in that said rod (3) is provided at one end with a cylindrical extension (133") whereby it is locked to the corresponding depression (22") the central part of the rod being polygonal, e.g., hexagonal in cross section and finished so as to be shiftable receivable by said sleeve (33) wherein said sleeve has a roughish outside whereby to be lockedly connectable to the corresponding depression (22).

10. Process, as claimed in claims 8 and 9, characterized in that the coupling is joined to the shoe last poles (2, 2') as an assembled unit (333, 333') obtained by mounting on the rod in succession: the snap ring (03), the sleeve (33) and the spring (30), wherein firstly the rear end (33") of the device is mounted in the rear pole (2') of the last, by enclosing the spring (30) within the last pole (2') and the snap ring (03).

11. Process, as claimed in claim 11, characterized in that the connection of coupling means (333, 333') at the forward end of device which is comprised by the sleeve (33) with the forward pole (2) of the shoe last is provided by a press whose pressing member (4') operates in combination with a removable backing bearing (4").

12. Process and means of using of bipolar footwear lasts with articulated polarities, as claimed in claims from the 1 to 4 and obtained with the process as claimed in claims from 5 to 11 characterized in that the preparation of the last to receive the shoe (5) being worked comprises a closest approaching of the shoe last polarities (2,

2') by drawing together their hollow holdable capsules (02, 02') and compressing at least a spring (30) whereby to provide the self distension of the last and of the shoe (5) by releasing of last leaving it under the action of at least a spring (30).

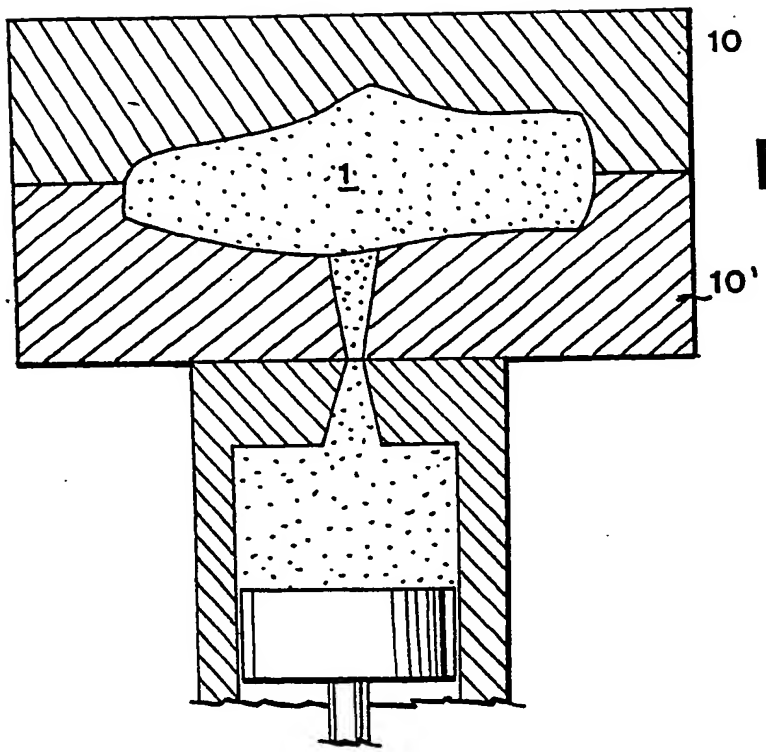


FIG.1

FIG.2

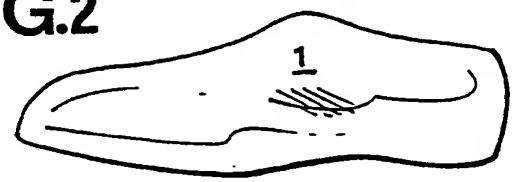


FIG.3

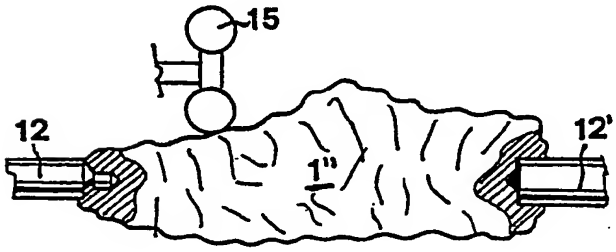


FIG.4

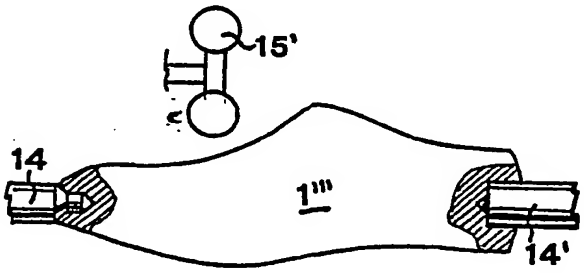


FIG.5

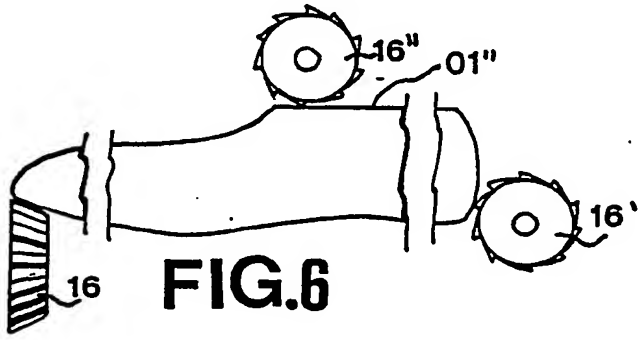


FIG.6

FIG.7

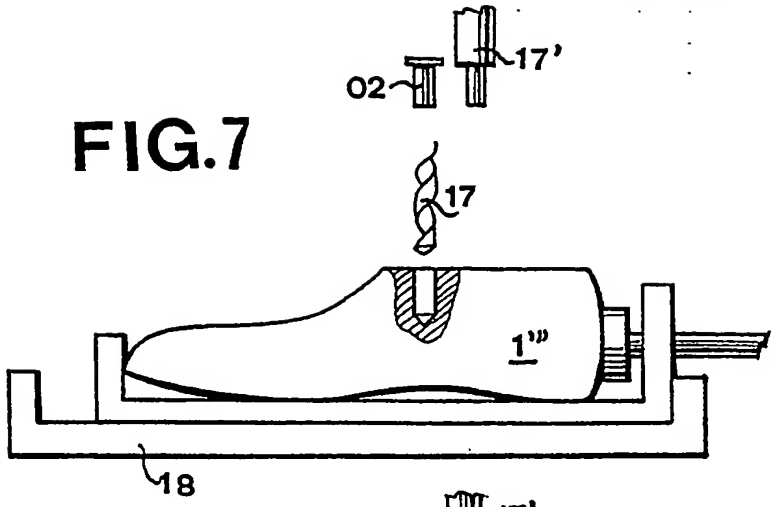


FIG.8

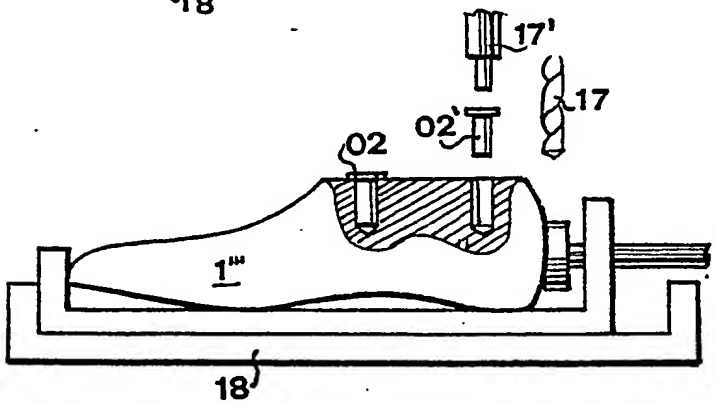


FIG.9

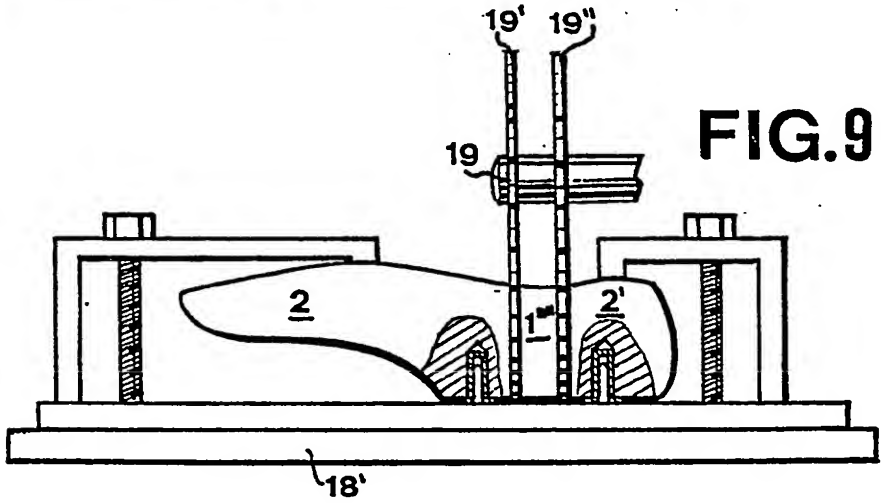


FIG.10

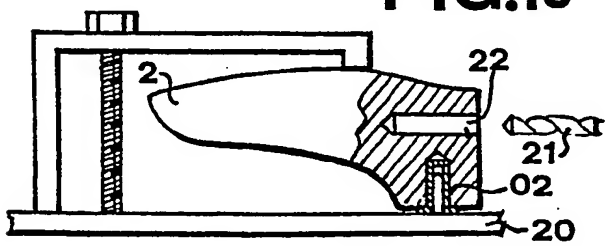


FIG.11

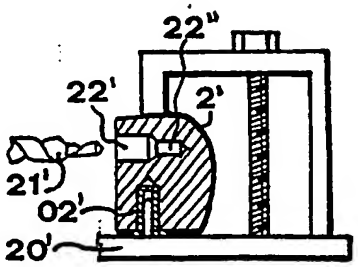


FIG.12

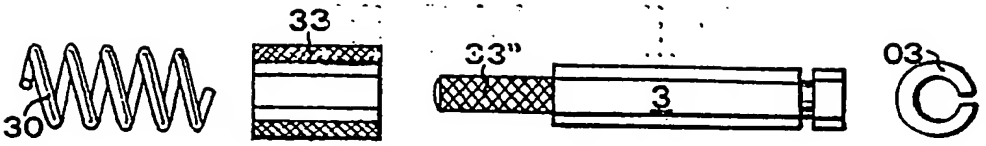
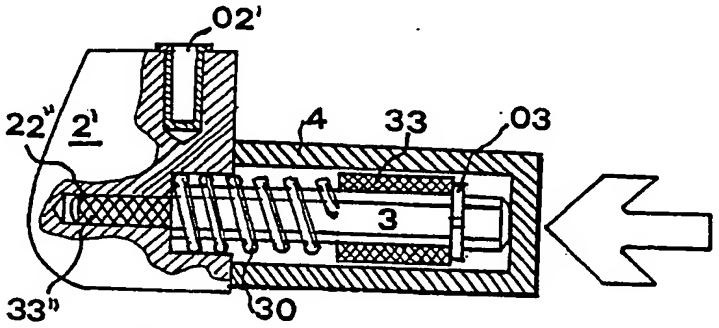


FIG.14



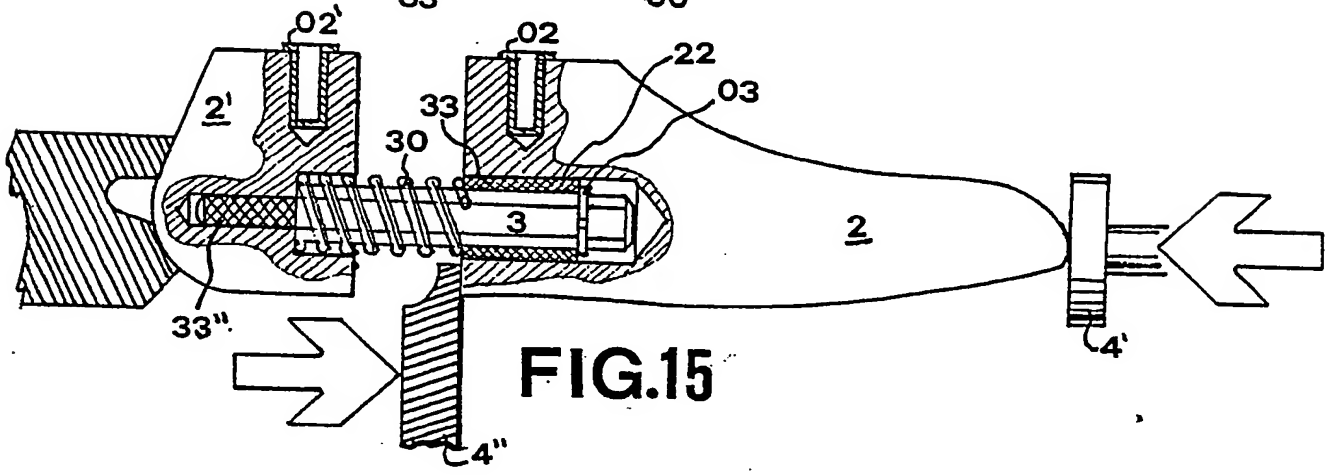


FIG.15

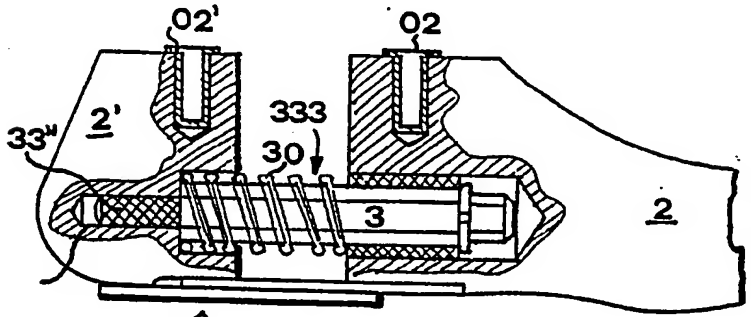


FIG.13

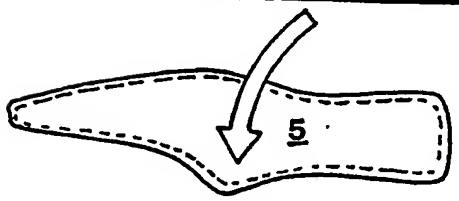
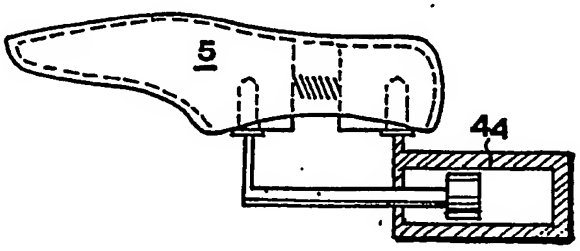


FIG.20



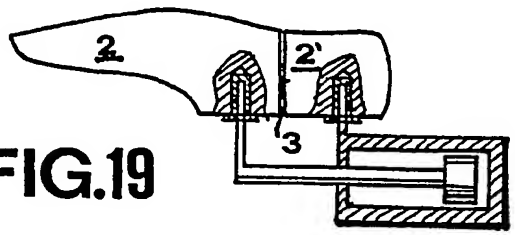


FIG.19

(só bo para estirar bo)

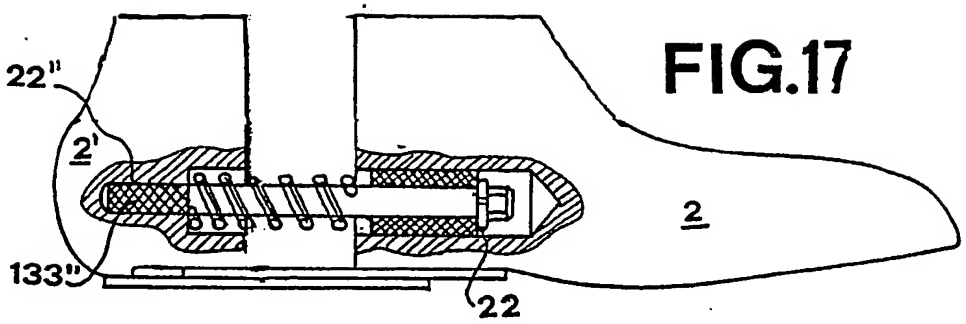


FIG.17

FIG.18

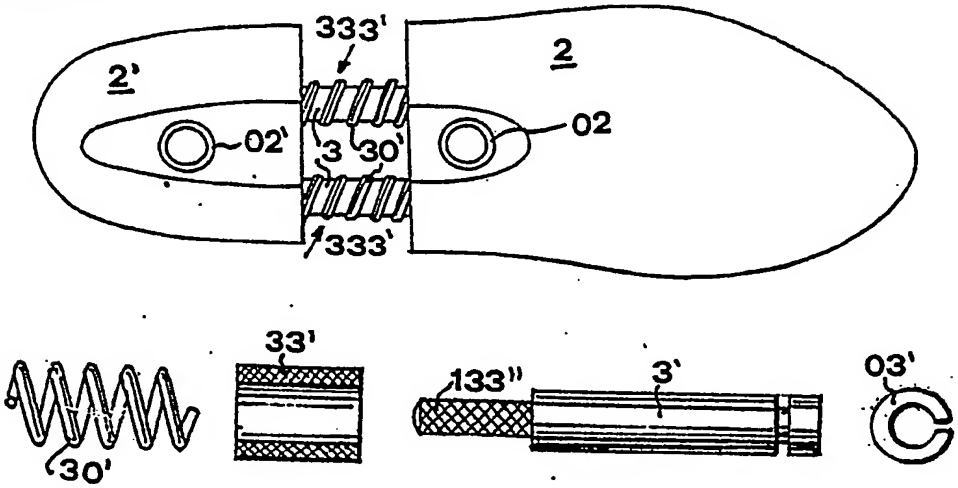


FIG.16

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 87 11 6712

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
X	FR-A- 587 890 (MARIOTTE) * Whole document *	1,2,12	A 43 D 3/00
A		3,8	
X	DE-C- 695 922 (SCHÖNHOFF) * Whole document *	1,2,12	
A		4,8,9	
X	FR-A- 695 385 (AMANN) * Whole document *	1,2,12	
A		3,8	
A	US-A-2 546 148 (LEWIS) * Figures *	3	
A	GB-A- 948 704 (WINKLE) * Page 1, lines 29-39 *	5	
A	FR-A- 718 748 (PLE) * Page 2, lines 32-40 *	5	
A	US-A-1 511 053 (DUCHEMIN)	5	TECHNICAL FIELDS SEARCHED (Int. Cl.4)
A	US-A-2 551 773 (TOPHAM)	5	A 43 D B 27 M B 23 C
A	FR-A-2 142 313 (CENTRE TECHNIQUE DU CUIR)	5	
A	US-A-1 587 065 (VULCAN LAST)	5	
A	US-A-1 454 160 (FITZPATRICK)	5	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	09-02-1988	RIS M.

CATEGORY OF CITED DOCUMENTS

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